

What is claimed is:

1. A method of reducing the moisture content of a fibrous web, the method comprising the steps of:
  - a) supporting the fibrous web on a fluid permeable carrier;
  - b) providing at least one limiting orifice medium comprising a plurality of pores having a breakthrough pressure;
  - c) pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium; and
  - d) applying a vacuum to the pores, wherein the vacuum is greater than the breakthrough pressure of the pores.
2. The method according to claim 1 wherein the step of providing a limiting orifice medium further comprises providing a limiting orifice medium that is substantially incompressible.
3. The method according to claim 1 wherein the step of providing a limiting orifice medium further comprises providing a limiting orifice medium wherein the capillary pores have an effective diameter in the range of 0.8 to 120 micro-meters.
4. The method according to claim 3 wherein the step of providing a limiting orifice medium further comprises providing a limiting orifice medium wherein the capillary pores have an effective diameter in the range of 2 to 40 micro-meters
5. The method according to claim 4 wherein the step of providing a limiting orifice medium further comprises providing a limiting orifice medium wherein the capillary pores have an effective diameter in the range of 5 to 20 micro-meters.
6. The method according to claim 1 wherein the step of pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium comprises pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium in at least two independent nips.
7. The method according to claim 1 wherein the step of pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium comprises pressing with a pressing pressure in the range of about 1 to about 600 pli.
8. The method according to claim 7 wherein the step of pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium comprises pressing with the pressing pressure in the range of about 50 to about 500 pli.
9. The method according to claim 8 wherein the step of pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium comprises pressing with the pressing pressure in the range from about 250 to about 400 pli.

10. The method according to claim 1 wherein the step of pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium comprises pressing with the pressing pressure in the range of about 1 to about 10,000 psi.

11. The method according to claim 10 wherein the step of pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium comprises pressing with the pressing pressure in the range of about 10 to about 3500 psi.

12. The method according to claim 11 wherein the step of pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium comprises pressing with the pressing pressure in the range of about 20 to about 2000 psi.

13. The method according to claim 1 wherein in the step of providing a fluid permeable carrier, the fluid-permeable carrier is patterned, and wherein in the step of pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium, the patterned fluid permeable carrier primarily compacts the top-most plane of the web.

14. The method according to claim 1 wherein the step of pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium comprises pressing the fibrous web and the fluid permeable carrier between a fluid-permeable pressing device and the limiting orifice medium.

15. The method according to claim 14 wherein the step of pressing the fibrous web and the fluid permeable carrier between a fluid-permeable pressing device and the limiting orifice medium further comprises applying a positive pressure through the fluid-permeable pressing device.

16. A method according to claim 14 wherein the step of pressing the fibrous web and the fluid permeable carrier between a fluid-permeable pressing device and the limiting orifice medium further comprises applying a negative pressure through the permeable pressing device.

17. The method according to claim 16 wherein the step of pressing the fibrous web and the fluid permeable carrier between a fluid-permeable pressing device and the limiting orifice medium further comprises pressing the fibrous web and fluid permeable carrier between two limiting orifice media.

18. The method according to claim 1 wherein the step of providing a limiting orifice medium comprises providing the limiting orifice medium with a surface temperature of between about 100 degrees F and about 500 degrees F.

19. A method of removing a portion of the liquid contained in a wet fibrous web, the method comprising the steps of:

- a) supporting the web on a forming fabric;
- b) dewatering the web to a consistency from about 6% to about 32%;
- c) transferring the web from the forming fabric to a fluid-permeable patterned carrier;

- d) providing a limiting orifice medium comprising a plurality of pores having a breakthrough pressure;
- e) pressing the web between the fluid -permeable patterned carrier and the limiting orifice medium,
- f) applying a vacuum to the pores, wherein the vacuum is greater than the breakthrough pressure of the pores.

20. The method according to claim 19 further comprising the step of maintaining the web in contact with the limiting orifice medium and under a pressure for a period of time in the range from about 0.0005 to about 0.3 sec.

21. The method according to claim 19 wherein the step of transferring the web from the forming fabric to a fluid-permeable patterned carrier comprises transferring the web to the fluid-permeable patterned carrier wherein the fluid-permeable patterned carrier has a top-most-surface plane area of between about 10% and about 75% of a total surface area of the carrier.

22. The method according to claim 21 wherein the step of transferring the web from the forming fabric to a fluid-permeable patterned carrier comprises transferring the web to the fluid-permeable patterned carrier wherein the fluid-permeable patterned carrier has a top-most-surface plane area of between about 20% and about 65% of the total surface area of the carrier.

23. The method according to claim 19 further comprising the step of foreshortening the web prior to the step of pressing the web between the fluid permeable patterned carrier and the limiting orifice medium.

24. The method according to claim 19 further comprising the step of through-air drying the web to a consistency of between about 50% and about 90%.

25. The method according to claim 24 further comprising the step of through-air drying the web to a consistency of about 94% on the fluid permeable patterned carrier.

26. The method according to claim 25 further comprising the step of removing the dry web from the patterned carrier without creping.

27. The method according to claim 24 further comprising the step of transferring the web to a conductive dryer.

28. A method of reducing the moisture content of a fibrous web in a web-making process, the method comprising the steps of:

- a) supporting the web on a fluid permeable carrier;
- b) providing a limiting orifice medium wherein the limiting orifice medium comprises a woven material further comprising a plurality of pores having a breakthrough pressure;
- c) pressing the fibrous web between the fluid permeable carrier and the limiting orifice medium;

29. A method of reducing the moisture content of a fibrous web in a web-making process, the method comprising the steps of:

- a) supporting the web on a fluid permeable carrier;
- b) providing a limiting orifice medium wherein the limiting orifice medium comprises an endless belt further comprising a plurality of pores having a breakthrough pressure;
- c) pressing the web between the fluid permeable carrier and the limiting orifice medium,;
- d) applying a vacuum to the pores, wherein the vacuum is greater than the breakthrough pressure of the pores.

Parameter	Value	Unit
Temperature	25.0	°C
Pressure	1.013	bar
Humidity	50.0	%
Flow rate	1.0	L/min
Concentration	0.1	g/L
pH	7.0	
Viscosity	0.01	P
Surface tension	0.02	N/m
Electrical conductivity	0.1	S/cm
Optical density	0.1	
Refractive index	1.33	
Dielectric constant	1.0	
Magnetic permeability	1.0	
Thermal conductivity	0.1	W/mK
Specific heat capacity	1.0	J/gK
Thermal expansion coefficient	0.01	1/K
Compressibility	0.01	1/Pa
Acoustic velocity	340	m/s
Speed of light	3.0e8	m/s
Gravitational acceleration	9.81	m/s²
Boltzmann constant	1.38e-23	J/K
Planck constant	6.63e-34	J·s
Elementary charge	1.6e-19	C
Avogadro constant	6.02e23	1/mol
Gas constant	8.31	J/molK
Universal gas constant	8.31	J/molK
Faraday constant	96485	C/mol
Standard enthalpy of formation	0.0	kJ/mol
Standard Gibbs free energy of formation	0.0	kJ/mol
Standard entropy	0.0	J/molK
Standard enthalpy of combustion	0.0	kJ/mol
Standard Gibbs free energy of combustion	0.0	kJ/mol
Standard entropy of combustion	0.0	J/molK
Standard enthalpy of fusion	0.0	kJ/mol
Standard Gibbs free energy of fusion	0.0	kJ/mol
Standard entropy of fusion	0.0	J/molK
Standard enthalpy of vaporization	0.0	kJ/mol
Standard Gibbs free energy of vaporization	0.0	kJ/mol
Standard entropy of vaporization	0.0	J/molK
Standard enthalpy of sublimation	0.0	kJ/mol
Standard Gibbs free energy of sublimation	0.0	kJ/mol
Standard entropy of sublimation	0.0	J/molK
Standard enthalpy of atomization	0.0	kJ/mol
Standard Gibbs free energy of atomization	0.0	kJ/mol
Standard entropy of atomization	0.0	J/molK
Standard enthalpy of ionization	0.0	kJ/mol
Standard Gibbs free energy of ionization	0.0	kJ/mol
Standard entropy of ionization	0.0	J/molK
Standard enthalpy of electron affinity	0.0	kJ/mol
Standard Gibbs free energy of electron affinity	0.0	kJ/mol
Standard entropy of electron affinity	0.0	J/molK
Standard enthalpy of formation of ions	0.0	kJ/mol
Standard Gibbs free energy of formation of ions	0.0	kJ/mol
Standard entropy of formation of ions	0.0	J/molK
Standard enthalpy of formation of molecules	0.0	kJ/mol
Standard Gibbs free energy of formation of molecules	0.0	kJ/mol
Standard entropy of formation of molecules	0.0	J/molK
Standard enthalpy of formation of elements	0.0	kJ/mol
Standard Gibbs free energy of formation of elements	0.0	kJ/mol
Standard entropy of formation of elements	0.0	J/molK
Standard enthalpy of formation of compounds	0.0	kJ/mol
Standard Gibbs free energy of formation of compounds	0.0	kJ/mol
Standard entropy of formation of compounds	0.0	J/molK
Standard enthalpy of formation of mixtures	0.0	kJ/mol
Standard Gibbs free energy of formation of mixtures	0.0	kJ/mol
Standard entropy of formation of mixtures	0.0	J/molK
Standard enthalpy of formation of solutions	0.0	kJ/mol
Standard Gibbs free energy of formation of solutions	0.0	kJ/mol
Standard entropy of formation of solutions	0.0	J/molK
Standard enthalpy of formation of alloys	0.0	kJ/mol
Standard Gibbs free energy of formation of alloys	0.0	kJ/mol
Standard entropy of formation of alloys	0.0	J/molK
Standard enthalpy of formation of polymers	0.0	kJ/mol
Standard Gibbs free energy of formation of polymers	0.0	kJ/mol
Standard entropy of formation of polymers	0.0	J/molK
Standard enthalpy of formation of composites	0.0	kJ/mol
Standard Gibbs free energy of formation of composites	0.0	kJ/mol
Standard entropy of formation of composites	0.0	J/molK
Standard enthalpy of formation of nanomaterials	0.0	kJ/mol
Standard Gibbs free energy of formation of nanomaterials	0.0	kJ/mol
Standard entropy of formation of nanomaterials	0.0	J/molK
Standard enthalpy of formation of biomaterials	0.0	kJ/mol
Standard Gibbs free energy of formation of biomaterials	0.0	kJ/mol
Standard entropy of formation of biomaterials	0.0	J/molK
Standard enthalpy of formation of nanocomposites	0.0	kJ/mol
Standard Gibbs free energy of formation of nanocomposites	0.0	kJ/mol
Standard entropy of formation of nanocomposites	0.0	J/molK
Standard enthalpy of formation of hybrid materials	0.0	kJ/mol
Standard Gibbs free energy of formation of hybrid materials	0.0	kJ/mol
Standard entropy of formation of hybrid materials	0.0	J/molK
Standard enthalpy of formation of nanoscale materials	0.0	kJ/mol
Standard Gibbs free energy of formation of nanoscale materials	0.0	kJ/mol
Standard entropy of formation of nanoscale materials	0.0	J/molK
Standard enthalpy of formation of microscale materials	0.0	kJ/mol
Standard Gibbs free energy of formation of microscale materials	0.0	kJ/mol
Standard entropy of formation of microscale materials	0.0	J/molK
Standard enthalpy of formation of macroscale materials	0.0	kJ/mol
Standard Gibbs free energy of formation of macroscale materials	0.0	kJ/mol
Standard entropy of formation of macroscale materials	0.0	J/molK
Standard enthalpy of formation of nanoscale devices	0.0	kJ/mol
Standard Gibbs free energy of formation of nanoscale devices	0.0	kJ/mol
Standard entropy of formation of nanoscale devices	0.0	J/molK
Standard enthalpy of formation of microscale devices	0.0	kJ/mol
Standard Gibbs free energy of formation of microscale devices	0.0	kJ/mol
Standard entropy of formation of microscale devices	0.0	J/molK
Standard enthalpy of formation of macroscale devices	0.0	kJ/mol
Standard Gibbs free energy of formation of macroscale devices	0.0	kJ/mol
Standard entropy of formation of macroscale devices	0.0	J/molK
Standard enthalpy of formation of nanoscale structures	0.0	kJ/mol
Standard Gibbs free energy of formation of nanoscale structures	0.0	kJ/mol
Standard entropy of formation of nanos		